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# Difference In The Trend of Preeclampsia Between Black Women and White Women Living In The Uk.

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**ABSTRACT.**
**INTRODUCTION.**
Preeclampsia is a major leading cause of maternal morbidity and mortality in the United Kingdom and worldwide. Thus, it is increasingly recognized as more than an isolated disease of pregnancy. Obese women aged above 35 at their first pregnancy have a greatly increased risk of high blood pressure and a considerable risk of developing preeclampsia and its complications. This is the case especially amongst black African women. Preeclampsia and its complications are more prevalent amongst black African women. The objective of the present study was to determine differences in the trend of preeclampsia between obese black women and white women aged 35-45 living in the UK. Also, the project aimed to investigate whether preeclampsia is common.
**Methodology**
The study was a systemic review article of UK studies. The search strategy was to retrieve articles from PubMed, Cochrane and UEL library using keywords words such as preeclampsia, ethnic groups, obesity, maternal age, other factors and pregnant women. Descriptive statistics and inferential statistic were used with 95 confidence interval.
**Results**
Black women developed Early Preeclampsia and Late Preeclampsia. The prevalence of Chronic Hypertension was more in black African women 651 (79%).
The BMI was increased more in black women (32.5) compared to other ethnic groups and Caucasian.
**Conclusion.**
This study has shown that 79% black African women in UK have a higher percentage of developing preeclampsia compared to Caucasian women and other ethnic groups.
This study has shown that pregnant black African women in the UK have 32.3% Overweight compared to other ethnic groups such as British Asians (25.6 %) and British White (24.7%).
**Keywords**: preeclampsia, ethnic groups, BMI, Obesity, overweight, maternal age, hypertension and other risk factors.

## I. INTRODUCTION

Kirsten, D and Deborah, H (2015) indicated that preeclampsia is a major cause of maternal and fetal mortality and a greater risk of chronic diseases such as chronic hypertension, heart disease, thrombosis and type 2 diabetes in the UK, the incidence ranking 2-10%. According to the Mbrrace study in 2012, there were 19 deaths in the UK attributed to preeclampsia and eclampsia. However the ONS (2014), reported there was one death due to preeclampsia in England.Globally preeclampsia is one the main causes of maternal mortality and morbidity accounting approximately 10-15% of maternal deaths and 18% of maternal deaths in the US alone and 15% of premature birth (Weeda, Z, 2013). The CMACE estimated that preeclampsia incident is Seven times higher in developing countries than the developed (CMACE, 2011).Adekane et al (2015) identified that preeclampsia is accountable for the world's large maternal and fetal mortality and morbidity with about 60.000 deaths per year worldwide due to preeclampsia acute complications such as eclampsia, CVD and other organ damage contributing to 75% fatalities.The study of Hernandez et al in 2009 found that Preeclampsia is a common disorder in pregnancy with a prevalence of 2-8% of pregnancies and it is estimated that a woman in her first pregnancy has a 1:250 chance of delivering preterm due to preeclampsia (Hernandez-Diaz et al, 2009).
Raymond et al (2011) found that the disease in late gestations of pregnancy has only a negligible increased risk for adverse pregnancy outcomes. The literature has shown that risk of preeclampsia increases as maternal BMI increases. Evidence from this study revealed that patients among the 10.196 meeting inclusion criteria, 1.119 developed the condition, women with normal weight 2.9% developed preeclampsia and those who were overweight with > BMI>25 about 4.5% developed preeclampsia and obese with BMI > 35 about 6.2% developed preeclampsia (Durst, J et al, 2015). According to Thangaratinas, S, et in 2012, the obesity is a growing threat to women of childbearing age, and stated that half of population is either overweight or obese in the UK, 40% of women gain more weight than recommended during pregnancy, nevertheless increased

excessive weight in pregnancy is associated with adverse pregnancy outcomes.Evidence revealed that obesity is a growing threat to women of childbearing age and half of women during pregnancy in the UK are obese (CEMACH, 2007). Also National Office Audit (2001) revealed that maternal obesity is a major risk of childhood obesity, which costs the UK NHS around, £o. 50 billion and the UK economy a further £2.3 billion in indirect.Globally rates of obesity have increasingly higher worldwide, affecting maternal health and in which black women have been affected than white. The study conducted in an Ottawa hospital from 2007-2010, BMI was used to classify women into normal weight, overweight, and obese. Obstetric outcomes were compared, the evidence showed that obese women have significantly higher with the rates 42% and normal have 25% (EL-Chaar, D, et al 2013).

The studies conducted by social medicine university of Bristol in 2007 and imperial college school of medicine London in 2006 have revealed that preeclampsia affects about 3.5% of pregnancies and it is a great cause of maternal and fetal morbidity and mortality in the UK and worldwide, also the study has shown that women who had preeclampsia are at increased risk of cardiovascular disease (Leanne, B et al. 2006 & Elisabeth, B et al. 2007).Nice (2010) also argued that hypertensive disorders of pregnancy cover a range of conditions including preeclampsia that is associated with increased perinatal mortality and morbidity causing 1 in 50 stillbirth and 10% of all preterm births and is the third causes of severe morbidity. NICE stated that Preeclampsia is and remains a leading cause of maternal death in UK accounting 725 of preeclampsia cases associated.

Hypertension is known as the biggest and an almost entirely treatable cause of cardiovascular disease, even small ethnic differences in its optimal management have large implications for health resources for all people and even worse in pregnancy. The evidence has reported a higher prevalence in black by 40.5% than in white (27.4%) in England and Wales, so therefore ethnic differences are the strongest evidence that there is inequality (Morris. J 2010).Kate, J et al (2014) stated that chronic hypertension complicates between 1% to 5% of pregnancies and literature, believes that there is an association between maternal advancing age and hypertension; in the UK for instance, it is likely to have paralleled the increase in the first delivery in women aged over 35 from 1% to 8%.In western countries, maternal age at first delivery has been increasingly high due to effective birth control, delayed in marriage and women's pursuit of higher education (Jane, C et Al, 2005). Nationwide US data believe that the risk of preeclampsia increases by 30%.

The overall aim of the current research is to confirm through evidence that there is a difference in the trend of preeclampsia between black women and white women living in the UK.

**Chapter 3.**

## II. METHODOLOGY.

This study is to assess the trends of preeclampsia risk factors between African and Caucasian women in the UK. The study design was a literature review. This method has different benefits such as short time to conduct cheaper, less personnel while granting access to a wide range of data in a relatively short time (Miller, 2003). The literature review was done using the databases PubMed, Medline, EMBASE, BMJ and EBSCO. The search strategy was summarized in the Prism Flow Chart below describing all the databases used and articles retrieved (Figure 1).The search was preeclampsia trends between African and Caucasian, pregnancy and obesity, maternal age and pregnancy, preeclampsia and ethnic groups, fertility, chronic hypertension in pregnancy separately and then combined them in each database. A search on Google scholar from 1993 t0 2015, PubMed 1966 to July 2015 and UEL online EBSCO academic search from 1994 to 2015 was used to gather data. English was the language of the search articles.This search was based by using the words preeclampsia, age, obesity, ethnicity, morbidity, fertility and other factors that are related to preeclampsia.

Preeclampsia, eclampsia, toxemia, meta-analysis, systematic review, risk factors, risk, causality, cohort studies, case-control studies were used to collect papers related to this study and key words for this project.

These peer –reviewed sources will help to compare different trends of preeclampsia risk factors between African and Caucasian women in the UK.Meta-analysis, a cohort or case-control design that included pre-eclampsia (either as an outcome or to define cases) and the risk factors of interest were the studies selected in this present study.The data collection was extracted from the included studies and resolved any differences by a critical analysis.

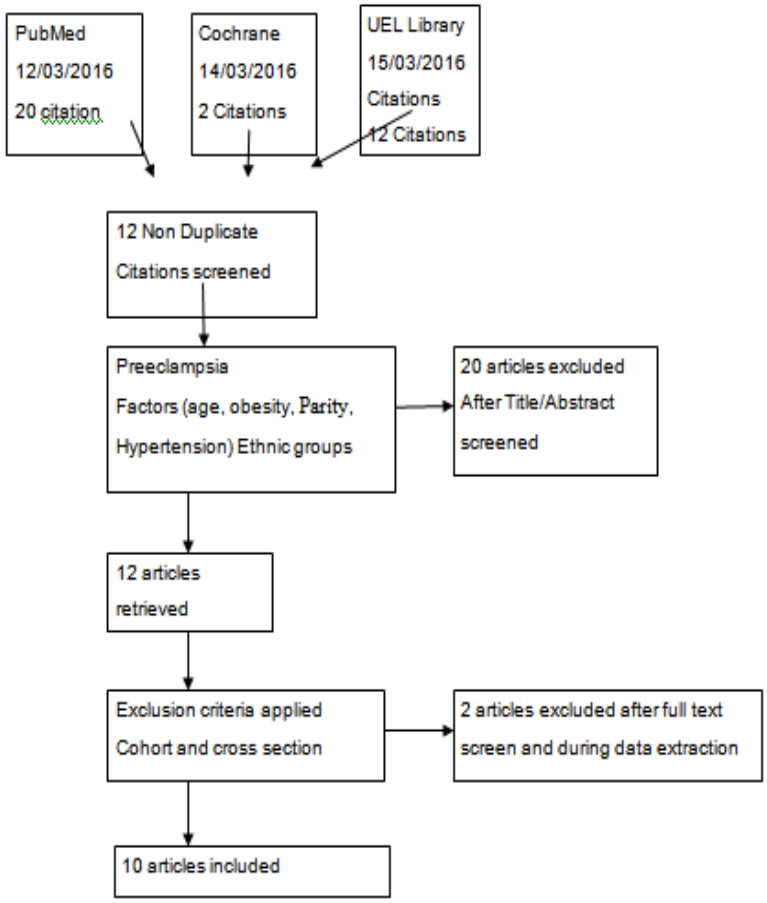


Figure 1: **Prism Flow Chart**

Boolean operators used to perform the search of the above databases were keywords with operators such as "AND", "NOT" and "OR "were used for more relevant results of the project (Figure 1).

**Chapter 4. Results and Findings**

This chapter presents the results of oriented by the study, research questions designed in our introduction section as follow:

1. Is there any difference in preeclampsia trends among black African and White women in the UK?
2. Are black women with BMI>25 at greater risk of developing preeclampsia in the UK?
3. Are black women at risk of developing preeclampsia as an ethnic group in the UK?
4. Are black women aged 35-45 at risk of developing preeclampsia in the UK?
5. Are there any other factors of developing preeclampsia in the UK?

In this systemic review study, only systemic review evidence based studies were selected to conduct this study. Using our PICO strategies defined in chapter 3, 5 articles fulfilled the selection criteria and are represented and summarize in the table 1 below.

Table 1. Articles selected in study from our search engine databases.

| Articles | Variables analyzed |
|---|---|
| LCY Poon et al, 2010 | Type of Preeclampsia by ethnic groups in UK |
| N Heslehurst1, J Rankin, JR Wilkinson CD Summerbell, 2010 | Obesity/BMI |
| Lucy et al, 2008 | Distribution of Pregnant women with Chronic Hypertension by ethnic groups in UK |
| Lydahs et al, 2008 | Chronic hypertension in pregnancy among different ethnic groups. Hypertension |
| M. J. ROBINSON et al, 1982 | Smoking as risk factors of preeclampsia |

The following variables were analyzed and documented such:

5.1 Is there any difference in preeclampsia trends among black African and White women in the UK?
5.2 Are black women with BMI>25 at greater risk of developing preeclampsia in the UK?
5.3 Are black women aged 35-45 at risk of developing preeclampsia in the UK?
5.4 Are there any other factors of developing preeclampsia?

**5.1 Is there any difference in preeclampsia trends among black African and White women in the UK?**

Predicting of Preeclampsia among women of different ethnic groups in the United Kingdom
Black women develop Early Preeclampsia and Late Preeclampsia as shown in Tableau 2 & 3.

**Table2. Demographic**, Pregnancy, and Management Characteristics of 822 Women with Preeclampsia from Lucy et al, 2008

| **Characteristic Preeclampsia (n=822)** | **Women** |
|---|---|
| Ethnic origin | |
| White | 117 (14%) |
| Black | 651(79% ) |
| Asian | 37 (4%) |
| Other | 17 (2%) |

The table shows black have rate of preeclampsia than white woman and other ethnic groups.

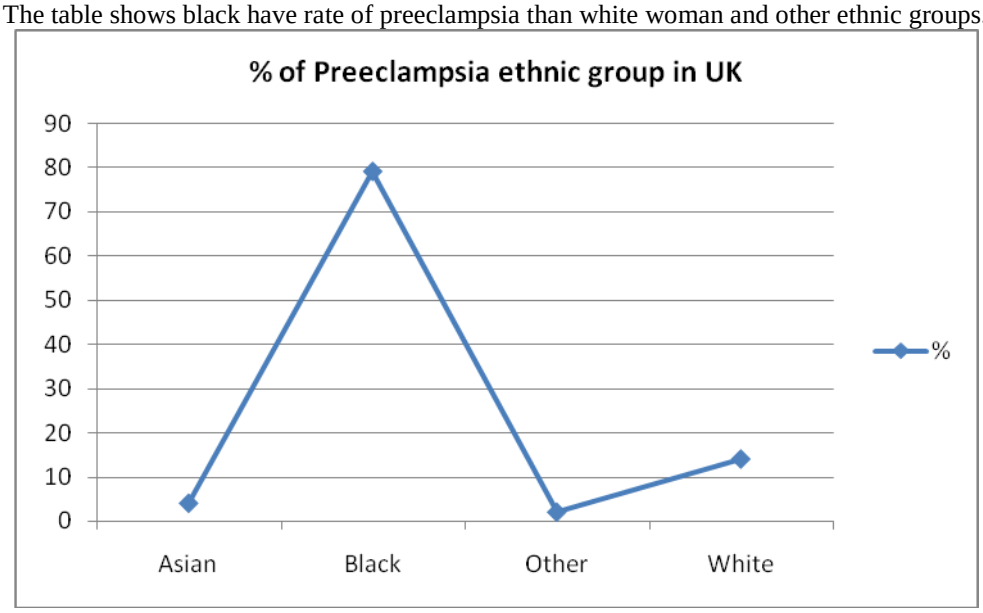


Figure: Trend of Preeclampsia in UK by ethnic groups.
The figure shows the trends of preeclampsia in UK with 79% for black African women.

Table3. Multiple regression analysis in predicting early preeclampsia, late preeclampsia and gestational hypertension from Lucy and al, 2008.

| Racial origin | Early preeclampsia (Adjusted OR (95% CI) | P | Late preeclampsia (Adjusted OR(95% CI) | P |
|---|---|---|---|---|
| Black | 3.64 (1.84–7.21) | ≤ 0.0001 | 2.97 (1.98–4.46) | ≤ 0.0001 |
| Indian or Pakistani | ---------- | | 2.66 (1.29–5.48) | 0.008 |
| Mixed | ---------- | | 3.31 (1.55–7.06) | 0.002 |

This table shows that black Africa is more affected to contract Early and Late preeclampsia.
This have shown the high prevalence of Chronic Hypertension to White pregnant women with 651(79%) cases.

**5.2 Are black women with BMI>25 at great risk of developing preeclampsia in UK?**

The BMI increase more in black women compared to other ethnic groups (Table 6 and graph 2 and 3).

Table 5. BMI distribution among ethnic groups' women living in United Kingdom (Heslehurst, J et al, 2010))

| Ethnic | Underweight BMI ≤18.5 N=31021 | Ideal BMI 18.5-24.9 N=353327 | Overweight BMI (Kgm² 25-29.9 N=153574 | Obese ≥30 N=53401 | Severe obese 35-39.9 N=19213 |
|---|---|---|---|---|---|
| White | 4.6 | 57 | 24.7 | 13.7 | 3.3 |
| Asian British | 8.2 | 55.8 | 25.6 | 10.4 | 2.1 |
| Black British | 4.3 | 42.8 | **32.3** | **20.6** | **4.7** |
| Mixed | 7.2 | 56.6 | 23.5 | 12.7 | 3.0 |
| Chinese or other ethnic groups | 9.2 | 62.7 | 20.5 | 7.6 | 1.3 |

The Table has shown that 32, 3 and 20.6 of Black pregnant women in the UK are respectively overweight and obese.

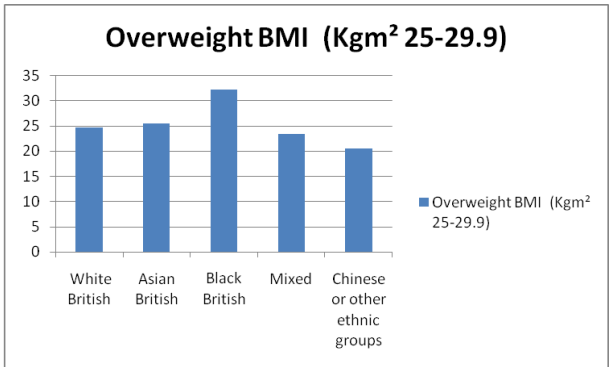


Figure 3. Overweight and ethnical group distribution in pregnant women in UK.
Black British pregnant women are more exposed to Overweight (BMI =25-29.9).

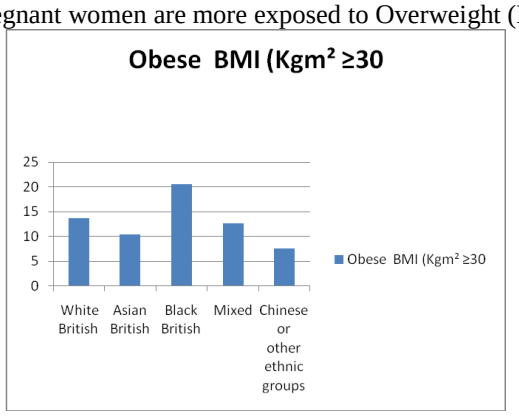


Figure 4. Obese BMI above 30 and ethnic group distribution in pregnant women in UK.
Black British pregnant women are more exposed to Obese (BMI ≥30)

**5.3. Are black women aged 35-45 at risk of developing preeclampsia in UK?**

The age was observed in the following distribution per race: Black had a mean 31.4 (SD 5.6), White 31.1 (SD 6.1) and Indo-Asian 31.1 (SD 6.1) (Figure 2).

Table 4 Maternal characteristics of chronic hypertension in pregnancy among different ethnic groups. Hypertension from Lydahs et al, 2008

| Ethnic groups | N | Age (years) Mean (SD) | PE in previous pregnancy N(% |
|---|---|---|---|
| White | 64 | 31.1(5.6) | 5(10.4) |
| Black | 79 | 31.4(5.3) | 12 (17.1) |
| Indo-Asian | 70 | 31.1(6.1) | 15( 24.6) |
| | | p=0.72 | P=0.1 |

This Table is significant of risk factors on the risk of chronic hypertension in pregnant women in the UK. (p=0, 72, p-0, 41 and p=0. 15).

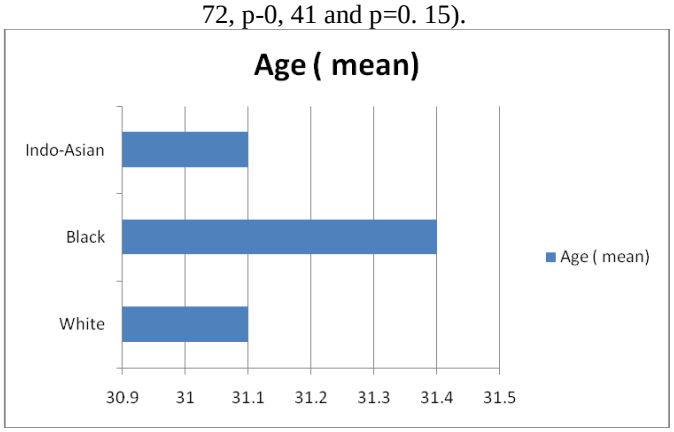


**Figure2: Preeclampsia and age by racial origin**
The black women shown age mean 31.1with p =0. 72 not significant

**5.4 Are there any other factors of developing preeclampsia in UK?**

**5.4.1 Risk for hypertensive disorders observed between women ethnic groups**

The statistics show that White develop Gestational hypertension 74.3% (104 out of 140 cases) (Tableau6). However, black women are leading in developing early preeclampsia and late preeclampsia respectively 48, 6 and 40, 6 % than other racial origin (Tableau 7)

Tableau 7**.** Risk for hypertensive disorders observed between women ethnic groups from LCY Poon et al., 2010.

| Racial origin | Early preeclampsia (n=37) | Late preeclampsia(n=28) | Gestational hypertension(140) |
|---|---|---|---|
| White, n (%) | 14 (37.8)z | 52 (40.6)z | 104 (74.3 |
| Black, n (%) | 18 (48.6)z | 56 (43.8) | 28 (20.0 |
| Indian or Pakistani, n (%) | 3 (8.1) | 9 (7.0) | 1 (0.7) |
| Chinese or Japanese, n (%) | 0 | 3 (2.3) | 1 (0.7) |
| Mixed, n (%) | 2 (5.4) | 8 (6.3) | 6 (4.3) |

The Tableau above have showing the higher risk of gestational hypertension to White and higher risk to develop Early and Late preeclampsia to black racial origin.

**5.4.2 Parity as Risk for Preeclampsia observed**

Nulliparous is more at risk to develop Early preeclampsia, Late preeclampsia and Gestational hypertension respectively 32, 4, 42.2, 38.6% as shown in Table7.

Tableau 8**. Parity** Risk for hypertensive disorders observed between women in UK from LCY Poon et al., 2010.

| Parity hypertension | Early preeclampsia (n=37) | Late preeclampsia (n=28) | Gestational (n=140 |
|---|---|---|---|
| Nulliparous, n (%) | 12 (32.4) | 54 (42.2) | 54 (38.6) |
| Miscarriage/termination o24 weeks, n (%) | 9 (24.3) | 24 (18.8) | 35 (25.0) |

Nulliparous have higher prevalence to lead early preeclampsia, late preeclampsia and Gestational hypertension as shown in the tableau 7 above.

**5.4.3 Previous preeclampsia**

The previous preeclampsia is more found to Asian women 15 mean with 24.6 SD compared to other group but not statically significant (p below 0.15).

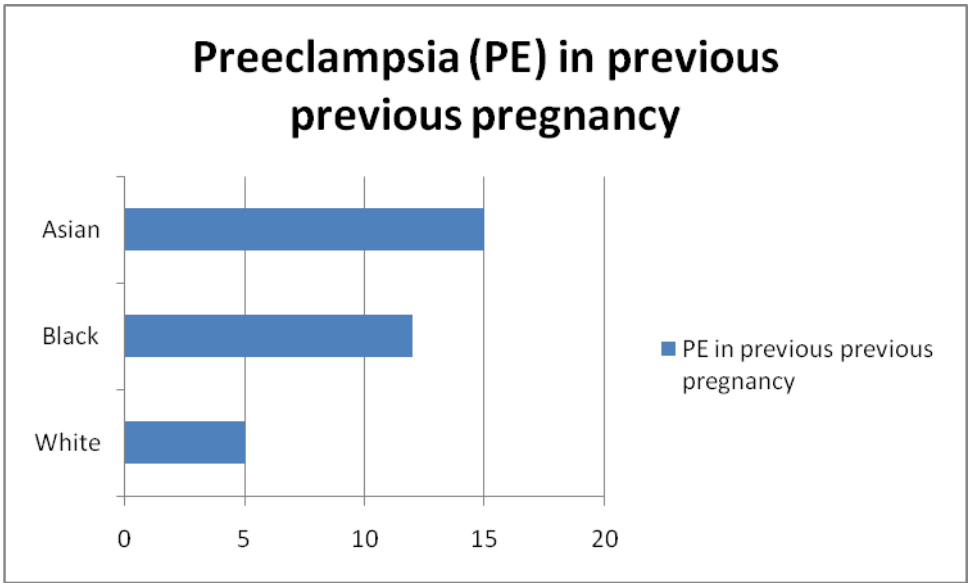


**Figure4.** Previous preeclampsia as risk factor by racial origin

The figure shown that 15 Asian women with 24.6 SD

**5.4.4 Preeclampsia ante partum hemorrhage among ethnic groups among women living in United Kingdom**

The relative risk of hemorrhage is more in African (1.3) as shown in tableau 6 and Figure 5

Table 6 British Deliveries and Preeclampsia from M. J. ROBINSON et al, 1982

| **Ethnic group** | **Normal. antenatal period** | **Pre-eclampsia .eclampsia** | **Ante partum haemorrhage** | **Others** | **Problem unknown** |
|---|---|---|---|---|---|
| **British** | 6523 | 2084 | 634 | 3623 | 28 |
| **West Indian** | 1610 | 462 | 120 3 | 868 | 3 |
| **African** | 996 | 236 | 77 | 590 | 4 |
| **Relative risk West Indian** | 1.4 | 2.6 | 0.8 | 1.4 | |
| **Relative risk African** | 0.9 | 1.6 | 1.3 | 1.6 | |

This Tableau have shown that the Relative risk African of hemorrhage is 1.3 compared to West Indian 0.8.

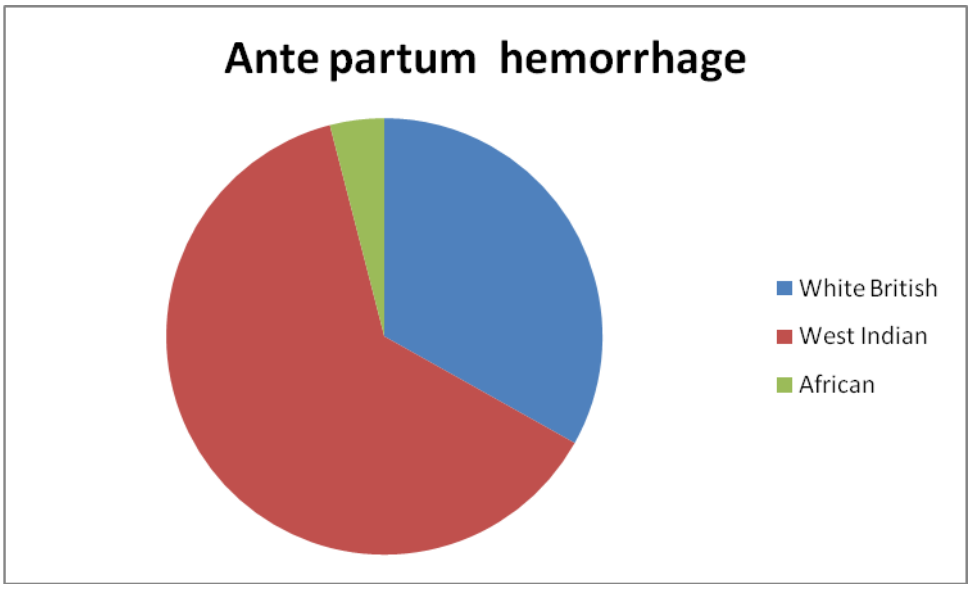


**Figure5. Risk of Ante partum hemorrhage by ethnic groups of women with preeclampsia**
The figure has shown a higher level of Ante partum hemorrhage to West Indian than African.

**Chapter 5.**

## III. DISCUSSION

In the section of the discussion is to state the answers of the questions posed in the introduction, explain the funding of this study to support the answers and, how the answers are fitting in the existing body of knowledge on the topic. And end this section our interpretations and opinions of our funding.
The following research questions will be answered and defended:
1. Is there any difference in preeclampsia trends among black African and White women in the UK?
2. Are black women with BMI>25 at greater risk of developing preeclampsia in the UK?
3. Are black women at risk of developing?
4. Are black women aged 35-45 at risk of developing preeclampsia in the UK?
4. Are there any other factors of developing preeclampsia in the UK?

### 5.1 Difference in Preeclampsia trends between black African and other ethnic groups of British women.

This study has shown that black African women in UK have a higher percentage of risk of developing preeclampsia compared to other ethnic groups. The evidence is that 79% of Black have developed Preeclampsia follow by the White British with 14% as shown in Figure 1 and Tableau In their recent study, Jihong Liu et al (2014) has observed that conducted in England in 2004, they have observed that racial disparities exist in preeclampsia with higher frequency in black women specifically 6.5% in black, 4.7% in white, and 3.8% of Hispanic women. Also Poon et al (2008) has founded also that black women are at risk of developing preeclampsia. In addition, Anne B et al (2008) in their survey has found preeclampsia in higher prevalence in black women in the USA and England. However, Journal of Women (2014) have found in their study that preeclampsia was higher in African Americans compared to Caucasians. Several suggestions were proposed to explain that higher percentage of preeclampsia in the black women.The exposure of the Black in the sunlight of southern latitudes which was strongly associated with higher blood pressure remain one of the strong mechanism. The other mechanism is dietary changes, and alteration in vitamin D regulation and calcium metabolism (Anne B et al, 2008). This may be explained also by healthcare system changes and disparities in obesity (Journal of Women (2014).

### 5.2 Black women with BMI>25 and at great risk of developing preeclampsia in UK?

This study shows that black African pregnant women in UK have 32.3% Overweight compared to other ethnic groups such as British Asia (25.6 %) and British White (24.7%) as shown in figure 3. In addition , This study shows that black African pregnant women in UK hare 20.6% Obese compared to other ethnic groups such as and British White 13.7%) and British Asia (10.4%) as shown in figure 4.
Nicole et al (2014) had found racial disparity with incidence of obesity significantly high in African American women Obese compared to Caucasian women. They are results were 78.0% were overweight (BMI ≥25 kg/m2), 47.2% were obese (BMI ≥30 kg/m2) and 15.0% were morbidly obese (BMI ≥40 kg/m2) similar to what

it was found in this study.However, in their study they did not found the relationship between obese Caucasian women and the higher risk of developing preeclampsia compared to the obese African-American women.
This higher rate obesity in black women in this study can be explain by Life style factors such as diet and physical activity. Yet this association between preeclampsia and life style remains unclear in the literature. The poor nutrition of black women can contribute to the obesity in UK. As shown in their study that in some studies deficiencies of certain micronutrients have been found to be negatively associated with BMI and other measures of body fat (Neuhouser ML, 2001). Also the intake of refined food and certain dietary deficiencies can explain the relationship between obesity and preeclampsia to black women.

**5.3 Are black women aged 35-45 at risk of developing preeclampsia in UK?**

This study shows that the black women aged at risk of developing preeclampsia in the UK is 26- 38 as shown in figure 2 and Table 4 cited above. In their recent work in the UK, Macdonald-Wallis C et al (2013) have found preeclampsia in group age 25-29 (35%) and 30-34 (20%). This is supporting the result found in the present study. However, Saftlas et al (1990) in their study conducted in the US suggested that women aged above 34 increased the risk of preeclampsia at 30%. So far studies have not found the scientifically significant of age effect as the risk of preeclampsia (Lucy et al., 2008).

**5.4. Are there any other factors of developing preeclampsia in UK?**

Nulliparous are other factors more at risk of developing preeclampsia in the UK. This study shows that early preeclampsia and late preeclampsia are found respectively in 32, 4 and 42.2 % as shown in Tableau7.
The recent study of Louise C et al (2014) has found the similar results like with higher risk of developing preeclampsia 3 to 5% of nulliparous women. Their results corroborate with this study findings of higher percentage of nulliparous black women. Likewise, the previous studies yield consistent finding that nulliparous have the risk of developing preeclampsia (Duckitt, K et al., 2005).

**Chapter 6 Conclusion and recommendation**

**6.1 Conclusion and recommendation.**

This study shows that 79% black African women in UK have a higher percentage to develop preeclampsia compared to other ethnic groupsThis study shows that black African pregnant women in the UK have 32.3% Overweight rates compared to other ethnic groups such as British Asians (25.6 %) and British White (24.7%)
Nulliparous are other factor risk of developing preeclampsia in the UK with respectively, higher risk of developing early preeclampsia and late preeclampsia that are found respectively in 32, 4 and 42.2 %. Also nulliparous almost triple the risk of preeclampsia from 2.9% to 28%, women who had it in a first pregnancy are 7 times at risk of preeclampsia in a second pregnancy, also the family history nearly triples the risk of preeclampsia from 1.70% to 4.93% (Kirsten, D et al, 2015), expecting twins triples risk and pre-existing medical condition quadruples such as chronic hypertension because women who develop the condition are more likely to have autoimmune disease relative risk. This project findings have identified clear continuing differences in the risk of severe maternal morbidities between different ethnic groups in UK, in which occurred more than twice in BME than in white women**.** Evidence from the project findings could argue that this pattern is very similar to reported ethnicity differences in preeclampsia may due to the presence of the presence of risk factors such as maternal age, obesity/overweight, hypertension and other risks outlined in this study. This highlights to clinicians and policy makers the importance of tailoring maternity services and the need of improving access to care for women from ethnicity minorities. Increasing number of pregnancies will be complicated by chronic hypertension, obesity, maternal, maternal age and other risk factors discussed above. As the trends continue for women to delay conception, together with the global epidemic of obesity, the consequences of complicated outcomes are not only costly in short term, but the long term health issues for women and their offspring, and with chronic hypertension the subsequent financial burden should be acknowledged. Lastly the findings of this project support the need of improved understanding of the pathophysiology of chronic hypertension and other risk factors outcomes to inform the development of predictive and diagnostic tools and enhance therapeutic interventions to reduce adverse pregnancy outcomes.

**Limitations.**

As a third year undergraduate project, the research has been limited by different factors, which are as follows: The study design was a big weakness because worldwide have conducted empirical survey. However this study was non empirical systematic reviews in UK wherein few studies were conducted. Another limitation was that, bearing in mind that the data sourced for this project might have been collected only from the UK, it thereby might not have fully reflected the aim of this study. Finally, the maximum word count of 6000 +/10%

for this project poses a barrier for its flexibility and its expansiveness. Moreover, further research studies are necessary to validate these findings.

**6.2 Recommendations.**

Awareness on weight gain of pregnant, healthy diet during pregnancy and to promote lifestyle habits and organized preconception counseling for reproductive age women will be recommended.

This strategy will bring both low risk of preeclampsia and chronic diseases related to pregnancy such as diabetes, CVD and hypertension.

Regardless of racial/ethnic disparities in the incidence of preeclampsia, the suggestion of to conduct more studies on the understanding of understand the racial/ethnic interactions with pre-pregnancy adiposity and elucidate mechanisms causing these differences.

Propose public health campaigns by targeting young adults (specifically women of reproductive age) who might have risk factors for developing preeclampsia. This will promote a dietary and behavior change that will reduce reproductive health outcomes and long-term health condition.

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